



**TRANSLATION**

Taiwan Patent Publication No. 288636

Publication Date: October 11, 1996

Title of the Invention: CURSOR CONTROLLING DEVICE USING A  
PRESSURE-SENSITIVE RESISTOR

Application No. 84208321; June 16, 1995

Inventor: Han-Che Wang

Applicant: Primax Electronic Ltd.



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ENGLISH TRANSLATION OF R.O.C. PATENT PUBLICATION NO. 288636

## CURSOR CONTROLLING DEVICE USING A PRESSURE-SENSITIVE RESISTOR

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### BACKGROUND OF THE INVENTION

#### Field of the Invention

10 The invention relates to a cursor controlling device, and more particularly to a cursor controlling device using a pressure-sensitive resistor.

#### Description of the Related Art

15 Generally, conventional cursor controlling devices, such as a mouse and a track ball, all utilize rolling balls, raster wheels, light emitting diodes, photo transistors, etc. to detect the movement of a cursor. However, the above-stated elements have certain limitations on, such as, the stability of the rotated raster wheels, the number of openings and resolutions of the raster wheels, the ranges and the stability of lights emitted by light emitting diodes and the demands of synchronous rotations between the rolling balls and raster wheels. Consequently, it is 20 desired to improve the conventional cursor controlling devices.

25 In addition, the conventional cursor controlling devices all need power lines to connect computers or are arranged on the cases of the computers (for example, notebook computers). Therefore, the use of the conventional cursor controlling devices is limited to spaces. Today, multimedia computers are extremely popular. If a speaker intends to express the applications relating to a multimedia computer, the speaker must close to the computer to operate a conventional cursor controlling device. As a result, it greatly limits the moving space of the speaker and 30 affects the process of the speech.

### SUMMARY OF THE INVENTION

35 A main object of the invention is to provide a cursor controlling device using a pressure-sensitive resistor. The cursor controlling device of the invention uses a pressure-sensitive resistor to detect the movement of a cursor thereby to prevent disadvantages of the conventional optical

mouse.

Another object of the present invention is to provide a cursor controlling device using a pressure-sensitive resistor. The cursor controlling device of the invention can remotely control the movement of a cursor of a computer so as to expand the moving space of users.

A further object of the invention is to provide a cursor controlling device using a pressure-sensitive resistor. The cursor controlling device of the invention has more extra functions to conduce to the applications of multimedia systems.

A cursor controlling device using a pressure-sensitive resistor according to the present invention is used to control the movement of a cursor on the screen of a computer. The cursor controlling device comprises a pressure-sensitive resistor having a resistance value varying with different pressures applied thereon; and a microprocessor electrically connected to the pressure-sensitive resistor for receiving and processing the resistant value to generate a cursor controlling signal so as to control the movement of the cursor.

Preferably, the microprocessor comprises an automatic switch scanning circuit electrically connected to the pressure-sensitive resistor for detecting the resistant value, an analog-to-digital converter electrically connected to the automatic switch scanning circuit for converting the resistant value into a digital signal and a central processor electrically connected to the analog-to-digital converter for receiving and processing the digital signal so as to control the movement of the cursor.

Preferably, the cursor controlling device further comprises an infrared emitter electrically connected to the microprocessor for emitting the cursor controlling signal to a decoder of the computer so as to remotely control the movement of the cursor, and a power supply device for supplying power source to the cursor controlling device.

The cursor controlling device using a pressure-sensitive resistor is arranged in a housing. On the surface of the housing are a cursor controlling push button for applying different pressures onto the pressure-sensitive resistor, and a set of functional push buttons, wherein the microprocessor executes a function corresponding to a functional push button pressed by users.

The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block circuit diagram showing a cursor controlling device using a pressure-sensitive resistor according to a first preferred embodiment of the invention;

Fig. 2 is a graph showing a relationship between pressure and resistance of a pressure-sensitive resistor;

Fig. 3 is a block circuit diagram showing a cursor controlling device using a pressure-sensitive resistor according to a second preferred embodiment of the invention; and

Fig. 4 is a schematic diagram showing a housing of a cursor controlling device using a pressure-sensitive resistor according to a preferred embodiment of the invention.

## DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig. 1, it is shown a schematic block circuit diagram of a cursor remote controlling device according to a first preferred embodiment of the invention. In Fig. 1, reference numeral 1 designates a cursor controlling device and reference numeral 2 designates a decoder arranged in a computer. The cursor controlling device 1 includes a pressure-sensitive resistor 11, an automatic switch scanning circuit 12, an analog-to-digital converter 13, a central processor (CPU) 14, an infrared emitter 15 (having a driver 151), a battery 16, a primary push button 17 and secondary push buttons 18.

The pressure-sensitive resistor 11 has a resistance value varying with different pressures applied thereon. Fig. 2 is a graph showing a relationship between pressure and resistance of the pressure-sensitive resistor 11. The pressure-sensitive resistor 11 is divided into 4 regions 111, 112, 113 and 114. Each region represents a moving direction (up, down, left or right). It is assumed that the region 111 indicates an movement in an up direction. When a user presses the region 111, a corresponding cursor moves up. The more the pressure is applied, the faster the cursor moves, and the like. The automatic switch scanning circuit 12 repeatedly scans four switches 121, 122, 123 and 124 to detect a region of the pressure-sensitive resistor pressed. The analog-to-digital converter 13 converts a scanning result into a digital signal. Then, The

central processor 14 receives the digital signal and generates a cursor controlling signal. The central processor 14 outputs the cursor controlling signal, and then, the infrared emitter 15 emits the cursor controlling signal to the decoder 2 to control the movement of the cursor on the screen of the computer. The battery 16 supplies power source needed for controlling the movement of the cursor. The primary push button 17 and the secondary push buttons 18 are electrically connected to the central processor 14. A signal generated by pressing the primary push button 17 or the secondary push buttons 18 is executed by the central processor 14, and then emitted by the infrared emitter 15. If there is no need to control the cursor in a remote way, it is unnecessary to have the battery 16. In this case, power source can be supplied by connecting a power line to the computer.

Based on the first preferred embodiment of the invention, the following application is developed. Referring to Figs. 3 and 4, Fig. 3 shows a block circuit diagram of a cursor controlling device using a pressure-sensitive resistor according to the second preferred embodiment of the invention, and Fig. 4 shows a housing of a cursor controlling device using a pressure-sensitive resistor according to a preferred embodiment of the invention. In Fig. 3, reference numeral 21 designates a pressure-sensitive resistor, reference numeral 22 designates a microprocessor, reference numeral 23 designates a battery, reference numeral 24 designates an infrared emitter and reference numeral 25 designates a set of functional push buttons. The pressure-sensitive resistor 21 includes four resistors 211-214. The infrared emitter 24 has a driver 241. Fig. 4 shows a housing 41 having a plurality of functional push buttons 25 and a cursor controlling push button 411 arranged thereon.

The cursor controlling device of the present invention uses the pressure-sensitive resistor to remotely control the movement of a cursor. In addition, the cursor controlling push button 411 can be arranged on the housing 41 of the cursor controlling device. Just to press the cursor controlling push button 411, the movement of the cursor can be controlled, and functional push buttons 25 (in Fig. 4) is used to allow the user to have different selections. In the second preferred embodiment, the automatic switch scanning circuit 12, the analog-to-digital converter 13 and the central processor (CPU) 14 of the first preferred embodiment are replaced with the microprocessor 22. Moreover, in the second embodiment, the

microprocessor 22 can execute the functions of the functional push buttons 25, such as the functions of the primary and secondary push buttons of a mouse and other functions (magnifier, telestrator, play, stop, rewind, volume control, channel control and hot key, and so on).  
5 Currently, multimedia computers are popular. The second preferred embodiment provides various functional push buttons to conduce to conveniences for operating multimedia systems and variety in applications. The secondary push buttons can be arranged on the right and left sides of the bottom of the housing 41 so as to facilitate the  
10 operations of the push buttons when holding the housing 41 is held.

In summary, the present invention is to provide a device using a pressure-sensitive resistor to detect the movement of a cursor, thereby avoiding disadvantages of the conventional rolling balls, raster wheels, photo transistors, light emitting diodes. Since a curve showing the  
15 relationship between pressure and resistance of the pressure-sensitive resistor is continuous, the speed of the movement of the cursor depends on the variations of pressures applied thereon. Furthermore, the cursor controlling device can allow users to remote control the movement of the cursor in wide spaces. For example, at a conference for presenting a  
20 multimedia computer, a user can remotely control a cursor of the computer without limitations caused by the location of the computer. This will greatly make the conference proceed in a smooth way. Furthermore, the cursor controlling device of the present invention is arranged with extra functional push buttons for high-level applications.

25 Although the invention has been disclosed in terms of a preferred embodiment, the disclosure is not intended to limit the invention. Those skilled in the art can make modifications within the scope and spirit of the invention which is determined by the claims below.

WHAT IS CLAIMED IS:

1. A cursor controlling device using a pressure-sensitive resistor, for controlling the movement of a cursor on the screen of a computer,  
5 comprising:

a pressure-sensitive resistor having a resistance value varying with pressures applied thereon; and

a microprocessor electrically connected to the pressure-sensitive resistor for receiving and processing the resistant value to generate a  
10 cursor controlling signal.

2. The cursor controlling device as claimed in claim 1, wherein the microprocessor comprises:

an automatic switch scanning circuit electrically connected to the  
15 pressure-sensitive resistor for detecting the resistant value;

an analog-to-digital converter electrically connected to the automatic switch scanning circuit for converting the resistant value into a digital signal;

a central processor electrically connected to the analog-to-digital converter for receiving and processing the digital signal so as to control  
20 the movement of the cursor.

3. The cursor controlling device as claimed in claim 2, further comprising:

25 an infrared emitter electrically connected to the microprocessor for emitting the cursor controlling signal to a decoder of the computer so as to remotely control the movement of the cursor; and

a power supply device for supplying power to the cursor controlling device using a pressure-sensitive resistor.  
30

4. The cursor controlling device as claimed in claim 3, wherein the sensor controlling device using a pressure-sensitive resistor is disposed in a housing, and on the surface of the housing are:

35 a cursor controlling push button for applying different pressures onto the pressure-sensitive resistor; and

a set of functional push buttons, wherein the microprocessor executes a function corresponding to a functional push button pressed by a user.



WHAT IS CLAIMED IS: (AMENDED CLAIMS ON MARCH, 1997)

5 1. A cursor controlling device using a pressure-sensitive resistor, for controlling the movement of a cursor on the screen of a computer, comprising:

a pressure-sensitive resistor having a resistance value varying with pressures applied thereon;

10 a microprocessor electrically connected to the pressure-sensitive resistor for receiving and processing the resistant value to generate a cursor controlling signal;

an infrared emitter electrically connected to the microprocessor for emitting the cursor controlling signal to a decoder of the computer so as to remotely control the movement of the cursor; and

15 a power supply device for supplying power to the cursor controlling device using a pressure-sensitive resistor.

2. The cursor controlling device as claimed in claim 1, wherein the microprocessor comprises:

20 an automatic switch scanning circuit electrically connected to the pressure-sensitive resistor for detecting the resistant value;

an analog-to-digital converter electrically connected to the automatic switch scanning circuit for converting the resistant value into a digital signal;

25 a central processor electrically connected to the analog-to-digital converter for receiving and processing the digital signal so as to control the movement of the cursor.

30 3. The cursor controlling device as claimed in claim 1, wherein the sensor controlling device using a pressure-sensitive resistor is disposed in a housing, and on the surface of the housing are:

a cursor controlling push button for applying different pressures onto the pressure-sensitive resistor; and

35 a set of functional push buttons, wherein the microprocessor executes a function corresponding to a functional push button pressed by a user.

## ABSTRACT OF THE DISCLOSURE

5 The invention relates to a cursor controlling device using a pressure-sensitive resistor for controlling the movement of a cursor on the screen of a computer. In the present invention, a pressure-sensitive resistor is used to control the movement of the cursor thereby to avoid disadvantage of an optical encoding mouse. Furthermore, the cursor controlling device of the present invention can allow users to flexibly remotely control the cursor in wide spaces. The cursor controlling device of the present invention also provides extra functions to conduce  
10 to the applications of multimedia systems.

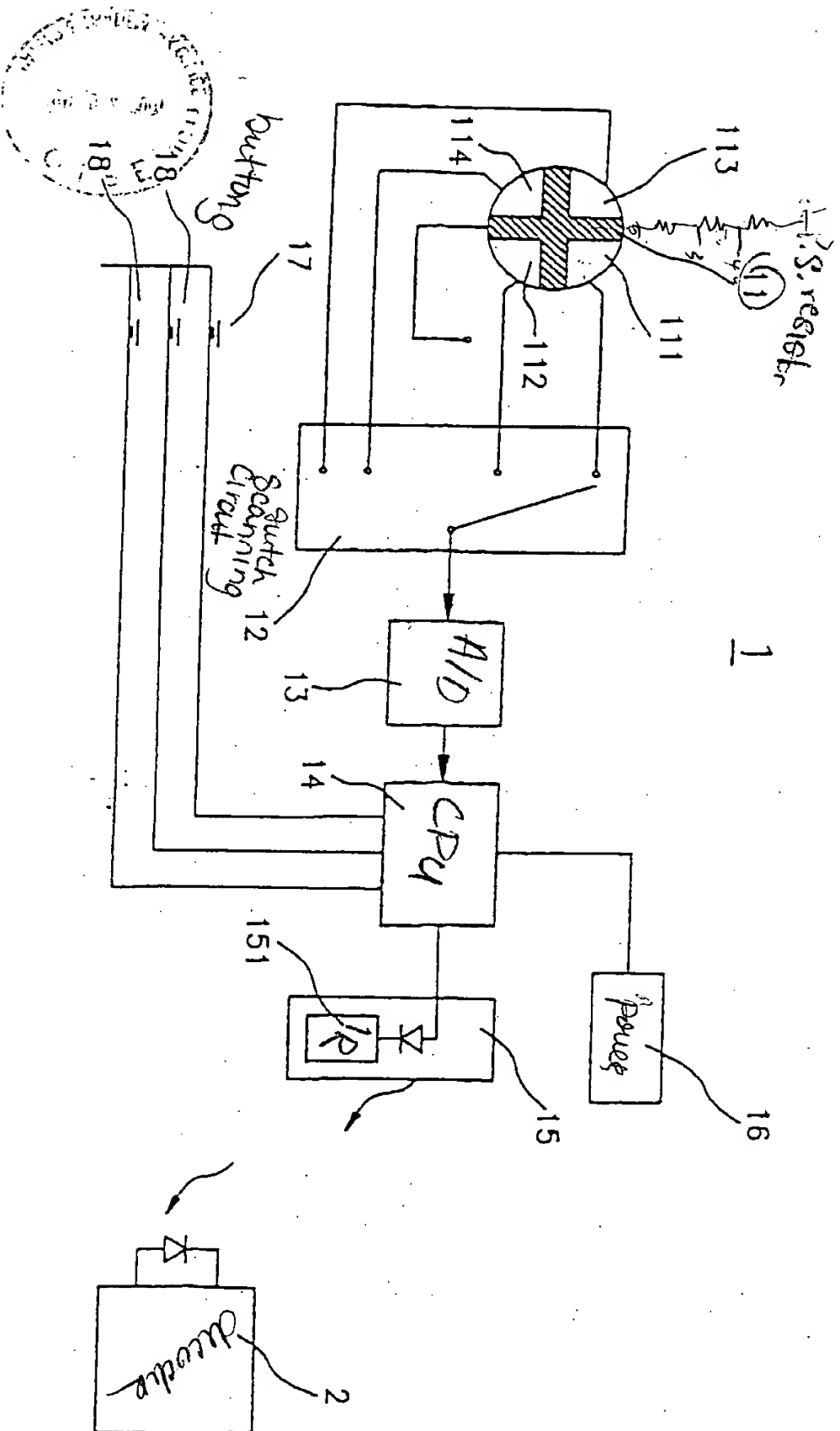


Fig. 1

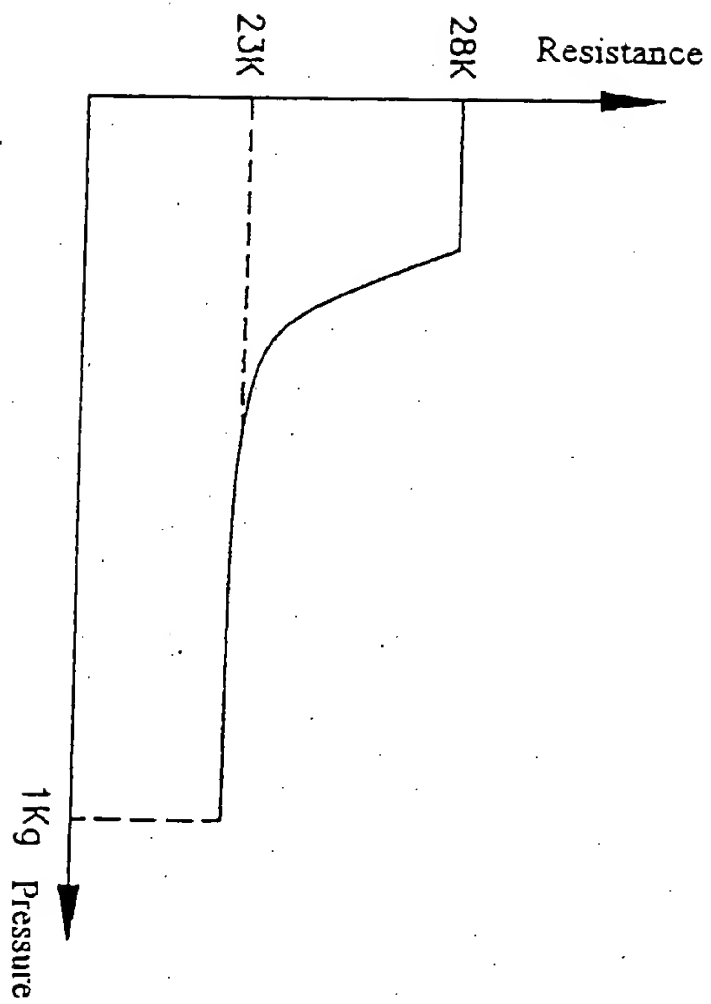
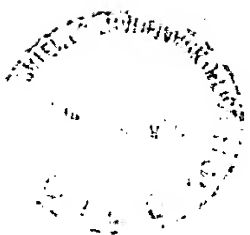


Fig. 2

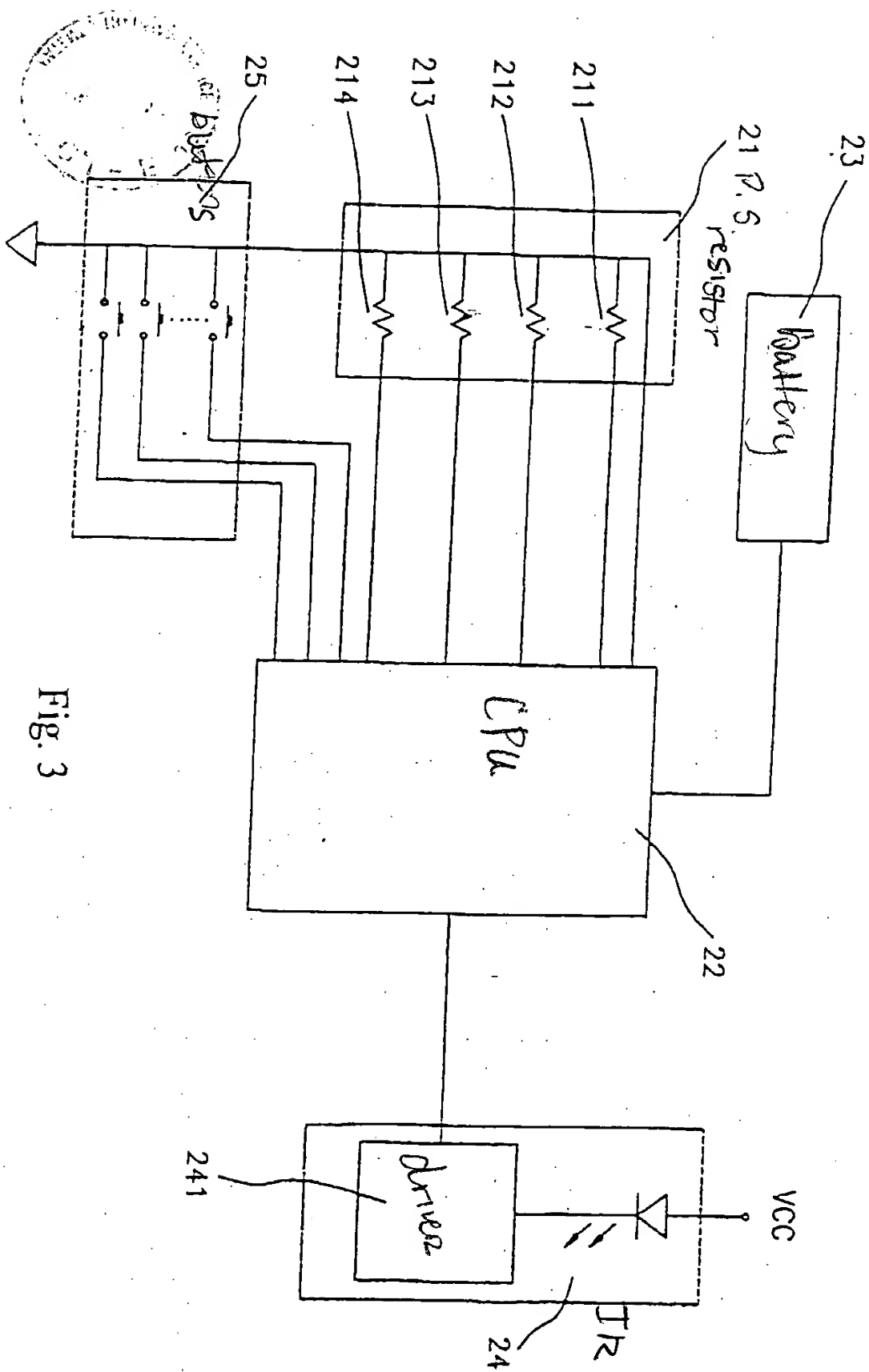


Fig. 3

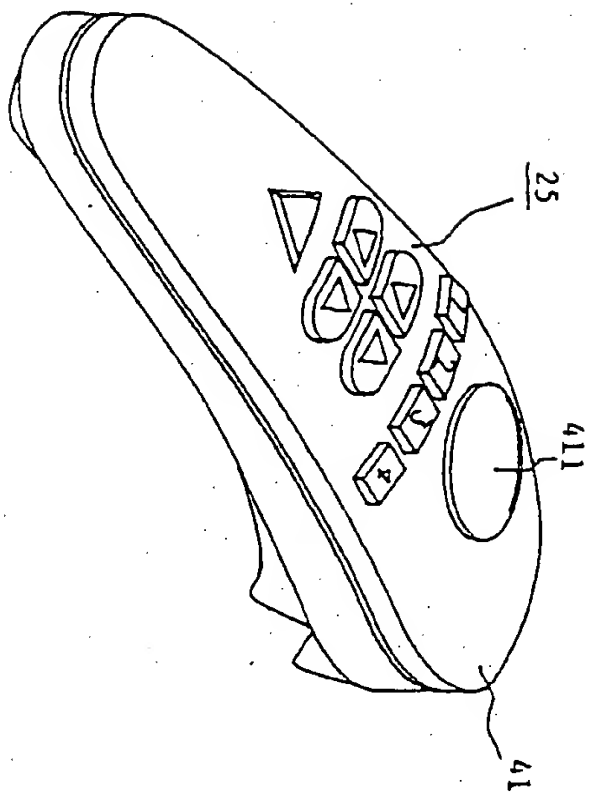


Fig. 4

## 公告本

288636

申請日期	84.6.18
案 號	34204321
類 別	G06F 3/033

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(以上各欄由本局填註)

## 發明專利說明書

一、發明 新型名稱	中 文	壓力感應電阻式游標控制裝置
	英 文	
二、發明 創作人	姓 名	1. 王漢哲
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	代 表 人 姓 名	梁立省

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## 五、創作說明(1)

本案係一種游標控制裝置，尤指一種壓力感應電阻式游標控制裝置。

習知之游標控制裝置，如滑鼠、軌跡球等，皆是以滾球、光柵輪、發光二極體以及光電晶體等元件來達成偵測游標移動狀態之手段，然因該等元件本身機構具有一定的限制，例如光柵輪轉動之穩定性，光柵輪之開孔數與解析度之限制，發光二極體所發射光束之範圍及光束之穩定性，滾球與光柵輪間之同步轉動需求等等，因此，習知之游標控制裝置確留有許多極待改進之處。

此外，習知之游標控制裝置皆需以電源線與電腦連接一起，或是直接設置於電腦主機殼體（如筆記型電腦），因此，游標控制裝置之使用空間即受到了限制。在多媒體電腦極為盛行之今日，如演說者欲以游標指示來說明有關電腦多媒體之應用，則必須緊鄰電腦而處，方可操作該游標控制裝置，大大地限制了使用者之活動空間與說明過程之流暢性。

本案之主要目的在提供一種壓力感應電阻式游標控制裝置，其係使用壓力感應電阻（Force Sensor Resister; FSR）為偵測位移之手段，俾避免習知光學滑鼠之缺失。

本案之另一目的在提供一種壓力感應電阻式游標控制裝置，其係以遙控方式控制電腦游標，俾擴大游標控制裝置之使用空間。

本案之又一目的在提供一種壓力感應電阻式游標控制

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## 五、創作說明 ( 2 )

裝置，其可具有多種附加功能，俾有助於多媒體系統之應用。

本案係一種壓力感應電阻式游標控制裝置，係用以控制一電腦螢幕上游標之移動，包括：一壓力感應電阻，可因應所受之不同壓力而表現不同之電阻值，一微處理器，電連接於該壓力感應電阻，接收並處理該壓力感應電阻所表現之不同之電阻值，而得一游標控制訊號，俾可控制游標之移動。

較佳者，該微處理器包括：一自動掃描開關組，電連接於該壓力感應電阻，用以偵測該不同之電阻值，一類比／數位轉換器，電連接於該自動掃描開關組，其接收該電阻值，將其轉為數位式訊號，一中央處理器，電連接於該類比／數位轉換器，其接收並處理該數位式訊號以得該游標控制訊號，俾可控制游標之移動。

較佳者，壓力感應電阻式游標控制裝置更包括：一紅外線發射器，電連接於該處理器，可將該游標控制訊號發射予該電腦之一解碼器，俾以遙控方式控制該游標之移動，一電源供應元件，用以提供該壓力感應電阻式游標控制裝置所需之電力來源。

該壓力感應電阻式游標控制裝置係裝設於一殼體，該殼體表面包括：一游標控制按鍵，可傳達該不同壓力予該壓力感應電阻，功能按鍵組，該微處理器可因應使用者所壓擊之該功能按鍵組而執行對應該被壓擊按鍵之功能。

本案得藉下列圖式及詳細說明，俾得一深入了解。

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## 五、創作說明(3)

第一圖：係本案壓力感應電阻式游標控制裝置之第一較佳實施例電路方塊示意圖。

第二圖：係壓力感測電阻(FSR)之壓力與電阻之關係曲線示意圖。

第三圖：係本案壓力感應電阻式游標控制裝置之第二較佳實施例電路方塊示意圖。

第四圖：係本案壓力感應電阻式游標控制裝置外殼之一較佳實施例示意圖。

請參閱圖一，係本案之第一較佳實施例方塊示意圖，圖一所表示者為以遙控方式控制游標之實施例，圖一表示了游標控制裝置1，以及設於電腦之解碼器2；本案之游標控制裝置1包括壓力感測電阻(FSR)11、自動掃描開關組12，類比/數位轉換器13、中央處理器14(CPU)，紅外線發射器15(紅外線發設器具有一驅動器151)、電池16，主按鍵17、副按鍵18。

FSR 11係一種可依據所受壓力之不同而產生不同阻值之元件，其壓力與阻值之變化曲線如圖二所示，於本實施例中，FSR 11分為4個區域111, 112, 113, 114，每一個區域代表一個移動方向(上、下、左、右)，假設區域111代表往上，則使用者壓下111表示游標往上，且FSR所受之壓力越大，游標之移動愈快，依此類推，自動掃描開關組12則重覆掃描該4個開關121, 122, 123, 124，以偵測FSR 11被壓下之區域，類比/數位轉換器13則將自動掃描開關組12之掃描結果轉為數位訊號，再輸出至CPU

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## 五、創作說明（4）

14處理，而得游標控制訊號，CPU 14輸出游標控制訊號可由紅外線發射器15發射予解碼器2，以控制電腦螢幕游標之移動。而電池16則可以供給本案游標控制所需之電力來源，主按鍵17及副按鍵18亦連接於CPU 14，使用者利用主、副按鍵17、18所下之指令亦由CPU 14處理，並由紅外線發射器15發射之。當然，如果不使用遙控方式控制，則可以不需電池16之設置，而以電源線連接至電腦，以取得電力來源。

當然，由圖一所提供之實施例可發展出如下之應用：請參閱圖三、四，圖三係本案壓力感應電阻式游標控制裝置之第二較佳實施例電路方塊示意圖，圖四係本案壓力感應電阻式游標控制裝置外殼之一較佳實施例示意圖。圖三表示了壓力感應電阻21、微處理器22、電池23、紅外線發射器24，以及功能按鍵組25；其中，壓力感應電阻21包括四部份電阻211-214，紅外線發射器24具有一驅動器241。圖四表示了外殼41以及設於外殼表面之複數個功能按鍵組25以及游標控制按鍵411。

本案之壓力感應電阻式游標控制裝置除了可以用壓力感應電阻來遙控控制游標外，更可於游標控制裝置之外殼41設置游標控制按鍵411，只要壓擊游標控制按鍵411即可控置游標之移動，以及功能按鍵組25（圖四），俾供使用者選擇不同之功能。於第二實施例中，第一實施例之自動掃描開關組12，類比/數位轉換器13、中央處理器14（CPU）所執行之工作可用一微處理器22（圖三）取代

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## 五、創作說明(5)

之，且於第二實施例中，微處理器22並包括執行該功能按鍵組25所對應之功能，例如同滑鼠之主、副鍵，以及其它功能：magnifier(螢幕放大)、Telestrator(標示註記)、play、stop、rewind、volume control、channel control、hot key等等。於多媒體電腦如此盛行之今日，本案第二實施例所提供之各個功能鍵將有助於提昇多媒體系統操控之便利性及應用之多樣化。當然，副鍵可設置於殼體41底部之左、右兩側，俾於握持時便於壓鍵動作之執行。

綜上所述，本案提供了一種以FSR為偵測游標之移動手段，因此，可以免除習知使用滾球、光柵輪、光電晶體、發光二極體等元件之缺失，另外，由於FSR之壓力與電阻之曲線變化為連續性，故游標之移動速度可依使用者施壓之強弱而改變。再者，本案之游標控制裝置可以遙控方式來控制游標之移動，可加大操作者之使用空間，例如於前述之多媒體電腦之說明會場中，操作者不必侷限電腦所在之位置，而可以遙控方式操控游標，大大地增加了會議之流暢性。此外，配合多種附加功能鍵之設置，可使本案游標控制裝置更具高度之應用性。

本案得由熟悉本技藝之人士任施匠思而為諸般修飾，然皆不脫如附申請專利範圍所欲保護者。

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四、中文創作摘要(創作之名稱: )

## 壓力感應電阻式游標控制裝置

本案係一種壓力感應電阻式游標控制裝置，可用以控制一電腦螢幕上游標之移動，其係利用壓力感應電阻做為控制游標移動之手段，以避免光學編碼式滑鼠之缺失，並可以遙控方式來控制游標，以擴大操控者之使用空間，其亦提供了多種附加功能之設置，俾有助於多媒體系統之應用。

英文創作摘要(創作之名稱: )

(請先閱讀背面之注意事項再填寫本頁各欄)

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## 六、申請專利範圍

1. 一種壓力感應電阻式游標控制裝置，係用以控制一電腦螢幕上游標之移動，包括：

一壓力感應電阻，可因應所受之不同壓力而表現不同之電阻值；

一微處理器，電連接於該壓力感應電阻，接收並處理該壓力感應電阻所表現之不同之電阻值，而得一游標控制訊號，俾可控制游標之移動。

2. 如申請專利範圍第1項所述之壓力感應電阻式游標控制裝置，該微處理器包括：

一自動掃描開關組，電連接於該壓力感應電阻，用以偵測該不同之電阻值；

一類比／數位轉換器，電連接於該自動掃描開關組，其接收該電阻值，將其轉為數位式訊號；

一中央處理器，電連接於該類比／數位轉換器，其接收並處理該數位式訊號以得該游標控制訊號，俾可控制游標之移動。

3. 如申請專利範圍第2項所述之壓力感應電阻式游標控制裝置，更包括：

一紅外線發射器，電連接於該處理器，可將該游標控制訊號發射予該電腦之一解碼器，俾以遙控方式控制該游標之移動；

一電源供應元件，用以提供該壓力感應電阻式游標控制裝置所需之電力來源。

(請先閱讀背面之注意事項再填寫本頁)

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## 六、申請專利範圍

4. 如申請專利範圍第3項所述之壓力感應電阻式游標控制裝置，該壓力感應電阻式游標控制裝置係裝設於一殼體，該殼體表面包括：

一游標控制按鍵，可傳達該不同壓力予該壓力感應電阻；以及

功能按鍵組，該微處理器可因應使用者所壓擊之該功能按鍵組而執行對應該被壓擊按鍵之功能。

(請先閱讀背面之注意事項再填寫本頁)

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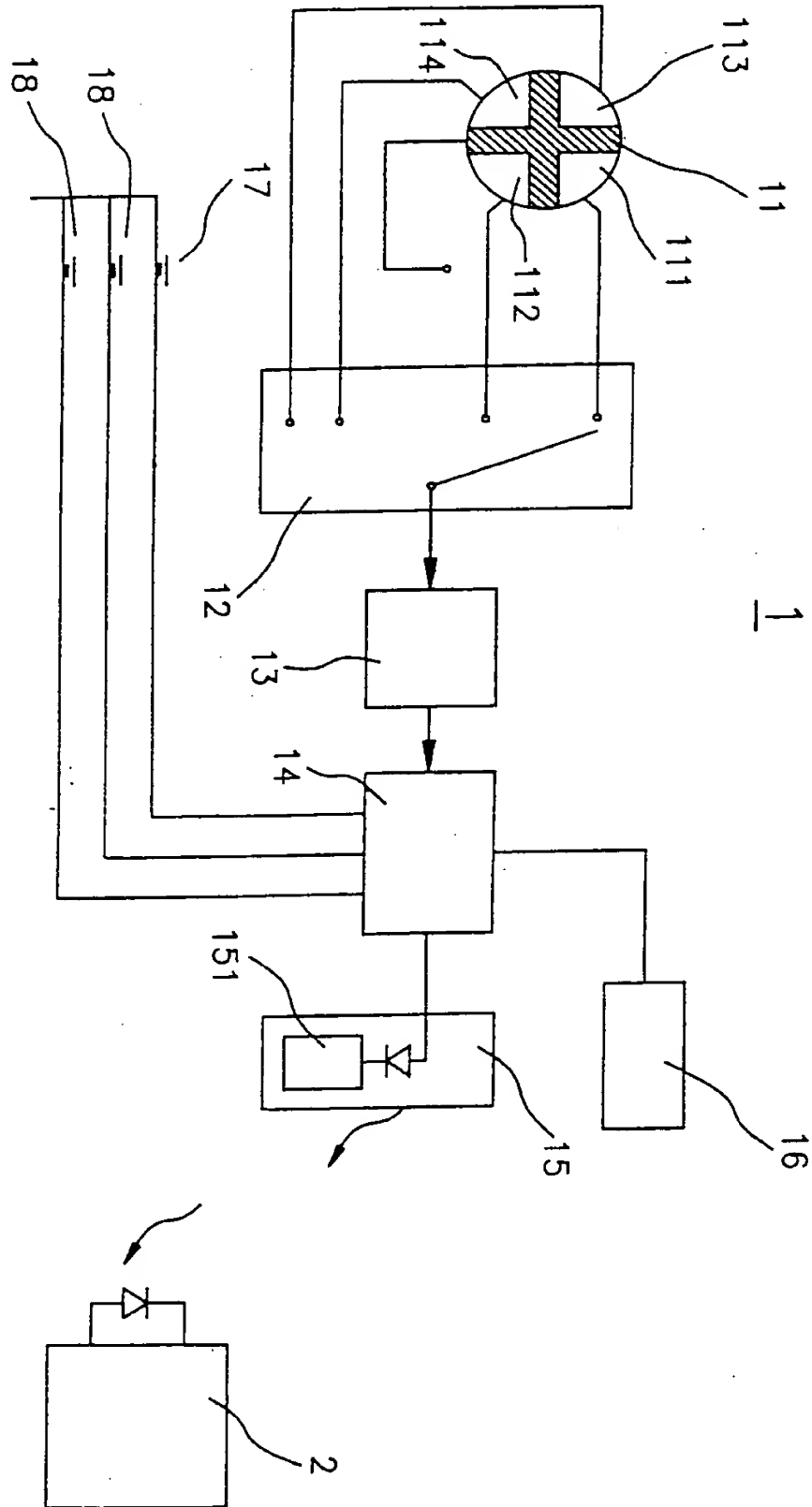
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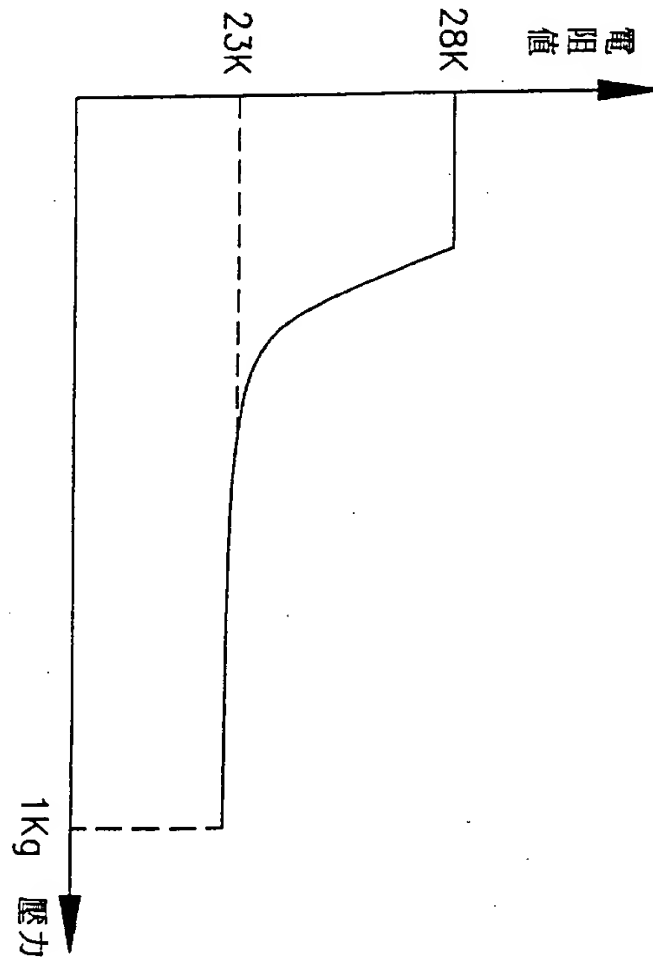
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第二圖

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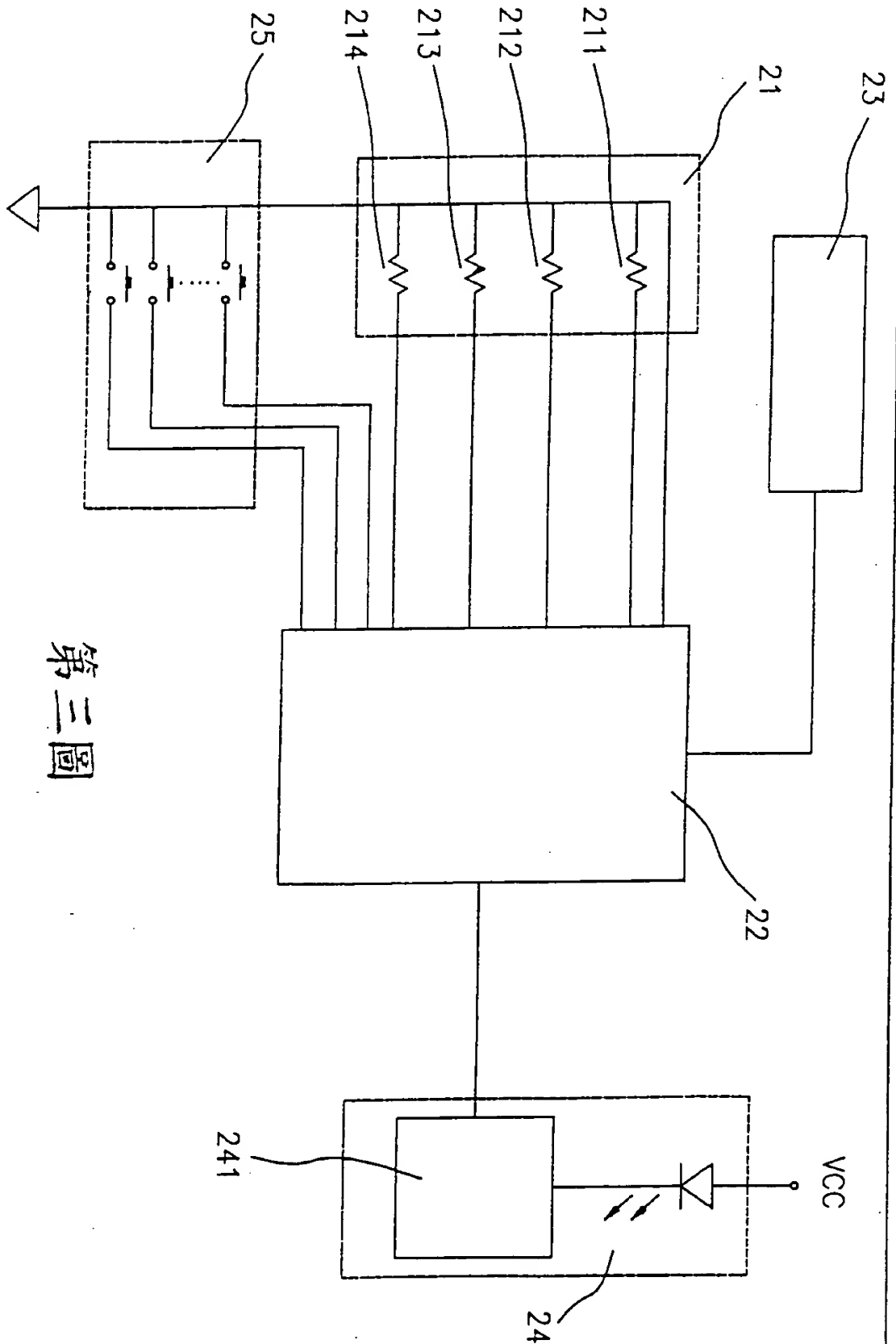
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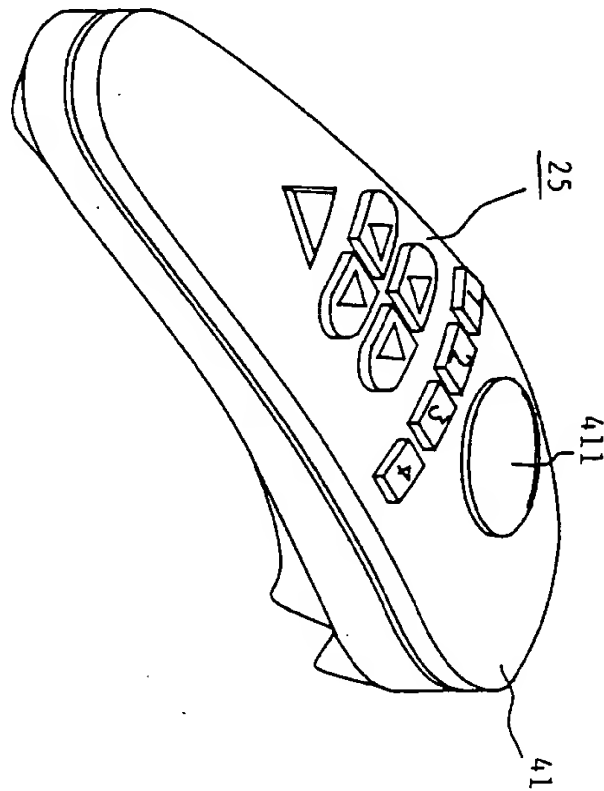


第三圖

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第四圖

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修正

(86年3月修正頁) 1997年3月12日

## 六、申請專利範圍

1. 一種壓力感應電阻式游標控制裝置，係用以控制一電腦螢幕上游標之移動，包括：

一壓力感應電阻，可因應所受之不同壓力而表現不同之電阻值；

一微處理器，電連接於該壓力感應電阻，接收並處理該壓力感應電阻所表現之不同之電阻值，而得一游標控制訊號；

一紅外線發射器，電連接於該微處理器，可將該游標控制訊號發射予該電腦之一解碼器，俾以遙控方式控制該游標之移動；以及

一電源供應元件，用以提供該壓力感應電阻式游標控制裝置所需之電力來源。

2. 如申請專利範圍第1項所述之壓力感應電阻式游標控制裝置，該微處理器包括：

一自動掃描開關組，電連接於該壓力感應電阻，用以偵測該不同之電阻值；

一類比／數位轉換器，電連接於該自動掃描開關組，其接收該電阻值，將其轉為數位式訊號；

一中央處理器，電連接於該類比／數位轉換器，其接收並處理該數位式訊號以得該游標控制訊號，俾可控制游標之移動。

3. 如申請專利範圍第1項所述之壓力感應電阻式游標控制裝置，該壓力感應電阻式游標控制裝置係裝設於一般體，該殼體表面包括：

(請先閱讀背面之注意事項再填寫本頁)

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## 六、申請專利範圍

(86年3月修正頁)

一 游標控制按鍵，可傳達該不同壓力予該壓力感應電阻；以及

功能按鍵組，該微處理器可因應使用者所壓擊之該功能按鍵組而執行對應該被壓擊按鍵之功能。

(請先閱讀背面之注意事項再填寫本頁)

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